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RANGE IMPROVEMENT

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NOTES

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(AGRI - OGDEN)

STATEMENT OF PURPOSE

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This publication is printed primarily to inform professional range administrators of important range improvement and management developments and findings. These "Notes" may include extracts of published papers, unpublished preliminary reports of research work, unpublished reports on administrative studies, and personal observations or suggestions of other range administrators. No claim is made as to the accuracy or completeness of studies or conclusions drawn.

All who read these RANGE IMPROVEMENT NOTES are encouraged to submit material for publication, or suggestions for improving its usefulness. Full credit will be given for any material used.

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REPORT ON EVALUATION OF DEEP FURROW DRILL

By
W. F. Currier 1/

- - - - -

Seeding Dry Meadows

Logan Valley, Prairie City Ranger
District, Malheur National Forest

Soils: Effective depth 18" to 36" topsoil, a light clay loam. Subsoil grades into a clay generally resting over basalt or lacustrine material.

Present vegetation: Cluster tarweed, annuals.

Rainfall: 16" to 20" annually with 4" to 6" coming during the warmer season (April to September).

Elevation: 5,000'

Reseeding problems of this site:

1. Eroded soils with surface puddling badly. Low in organic matter.
2. Low fertility soil.

Seeding techniques used:

1. Rangeland drill converted to deep furrow drill used to break up surface and put seed below surface puddling.
- *2. Placed fertilizer in drill row. Seeded in spring to make best use of fertilizer.

*With early spring seedings and using a furrow drill, moisture is generally not limited on this site.

1/. Forester, U.S. Forest Service, Northwest Region, and
Committee Member Range Reseeding Equipment Committee

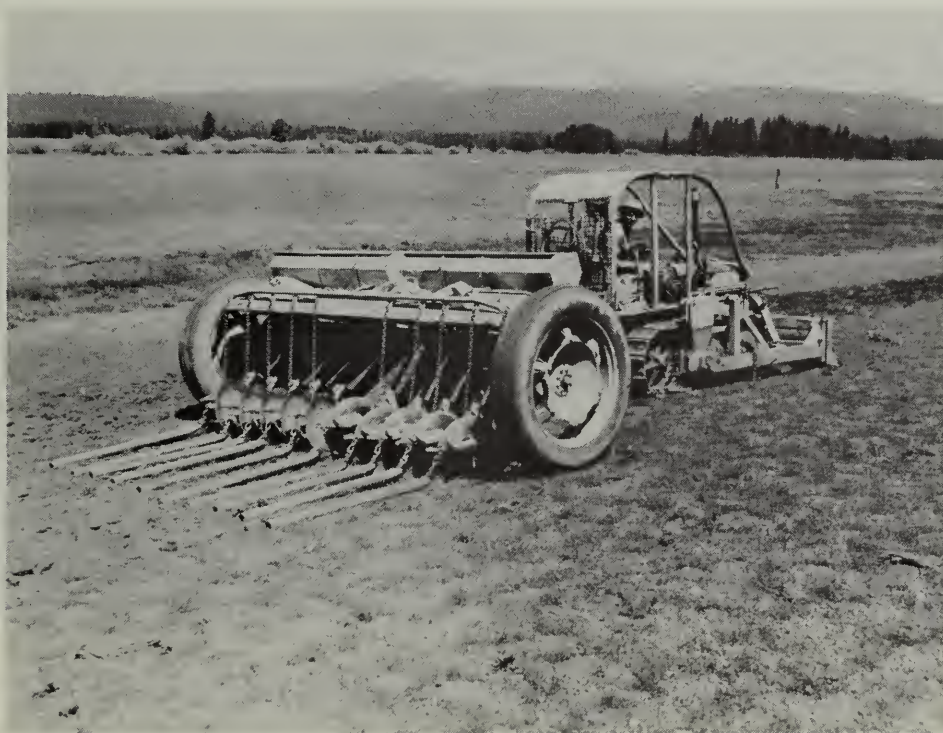
Reseeding problems of this site:

3. Acute competition from native vegetation. (Tarweed)

Seeding techniques used:

3. (a) Deep furrow drill used in spring seeding to eliminate sprouting weeds in drill row.
- (b) Spray to kill tarweed as needed after grass seedlings have developed sufficiently.

Spring seedings are successful on this site if equipment can be brought into area early. (April or May).



Rangeland drill converted into a deep furrow drill. This was done by simply (1) removing depth regulator bands; (2) adding or taking off disc weights to fit seedbed conditions. Discs are cupped and canted enough to make very good furrows. Pipes are in lieu of press wheels and have worked satisfactorily under all conditions tried. The rangeland drill used as a deep furrow drill has given excellent results under

all conditions tried. Over 1,000 acres have been seeded to date with no breakage. There is a possibility that the disc bearings are not strong enough for this type of seeding. Furrows cannot be made under tough sod conditions.



Close-up of furrows made by rangeland drill on dry meadow site. Seeding made in April 1957.

Logan Valley Seeding - 350 Acres



Logan Valley, Malheur National Forest, showing stand resulting from deep furrow spring seeding on unprepared seedbed. Seeded in April 1957. Picture taken in October 1957. The picture does not do the stand justice. Actually there is an excellent stand of grass.



Same seeding during spring of second growing season. Picture taken June 6, 1958.



Same seeding at end of second growing season. Picture taken October 1958.

History of seeding:

April 1957, seeded to pubescent wheatgrass, 4 lbs., intermediate wheatgrass, 4 lbs., and hard fescue, 1 lb., placing 75 lbs. per acre of ammonium sulphate in drill row.

June 1957, sprayed with 2,4-D to kill tarweed competition.

Seeding Sandy Uplands

South Gray Butte Pasture, Madras
LU Project, Ochoco National Forest

Soils: Deep pumice sand, very little soil development. Surface texture a sandy loam.

Present vegetation: Cheatgrass, cereal rye, annual weeds.

Rainfall: 8" to 10" annually, most of it coming in winter months.

Elevation: 2,600'

Reseeding problems of this site:

Seeding techniques used:

- | | |
|---|---|
| 1. Unstable soils subject to severe wind erosion. | 1. Used rangeland deep furrow drill to eliminate cheatgrass competition. No other seed-bed preparation was used, thereby leaving all litter and trash on surface. |
| *2. Soils of low moisture holding capacity. | 2. Seeded in fall, to take advantage of early spring moisture. |

*Deep furrows catch and hold snow and rain which falls.

Fall or very early Spring seedings are best on this site.

L. U. Project Seeding - 200 Acres



Rangeland drill used as a deep furrow drill to seed sandy uplands, LU project, Madras, Oregon. Seeded in December 1956. Pictures taken at time of seeding. The rangeland drill did a very good job under these conditions.



A good stand resulting from seeding made on sandy uplands, LU project, Madras, Oregon.

Seeding Shallow Droughty Uplands

McCoin Creek, Drews Valley Ranger
District, Fremont National Forest

Soil: Effective depth 10" to 20". Topsoil texture is a clay loam.
Subsoil grades into a clay resting on basalt.

Present vegetation: Low sage is main shrub. Small amounts of
bitterbrush are present; weeds such as lupine, yarrow,
buckwheat, and desert phlox are found. Remnants of Idaho
fescue, Sandberg's bluegrass and squirreltail are present.

Rainfall: 15" to 20" annually, most of it coming in the winter months.

Elevation: 5,500'

Reseeding problems of this site:

1. Acute competition by native
vegetation. (Low sage and
weeds)

2. Shallow droughty soil.

*3. Heavy subsoil.

Seeding techniques used:

1. Tilled with brushland plow.

2. Seeded in fall with rangeland
drill converted to deep furrow
implement. (Furrows collect
and hold moisture.)

*Species selected for this site should have a root system which will
penetrate the heavy subsoil and also withstand periods of low soil
moisture.

Fall seed shallow, droughty uplands.

McCain Creek Seeding - 225 Acres



Seeding made on shallow droughty uplands, McCain Creek, Fremont National Forest. The site was plowed once with brushland plow in summer of 1957. Area was covered with low sage. Seeded with rangeland drill converted to deep furrow implement. Seeded in October 1957. Picture taken November 1957. The rangeland drill did a very satisfactory job under the above conditions.



McCain Creek seeding during first growing season. Picture taken July 1958. History of seeding: (a) July 1957, plowed with brushland plow; (b) October 1957, seeded to pubescent wheatgrass, 8 lbs. per acre using rangeland drill as deep furrow implement. No fertilizer used.

Seeding Heavily Eroded Meadows

Gray Prairie Meadow, Big Summit Ranger
District, Ochoco National Forest

Soils: Topsoil gone. 12" to 14" of heavy clay subsoil over basalt.

Present vegetation: Wyethia, knotweed, tarweed.

Rainfall: 20" to 25" annually with " to 6" coming during the
growing season.

Elevation: 3,500'

Reseeding problems of this site:

1. Moisture intake rate is low
in this eroded heavy soil.
2. Severe competition from
native vegetation.
3. Low fertility soil.
4. Heavy clay soils, low in
organic matter causing a
heaving and crusting prob-
lem. Deep furrow seeding
may help correct this
crusting and heaving prob-
lem.

Seeding techniques used:

1. (a) Area contour trenched
to stabilize soil and
hold water.

(b) Use deep furrow drill
on contour. Furrows
hold moisture which
will soak into ground.
2. (a) Plow with brushland
plow.

(b) Use furrow drill to
eliminate competition
in drill row.
3. Place fertilizer in drill row
at time of seeding.

Fall seed heavily eroded meadows.

Gray Prairie Seeding - 35 Acres



Seeding made with rangeland drill on prepared seedbed September 1957. Contours did a good job of stopping overland flow of soil and water. Also held water which subbed from one contour to next and aided in establishing grass.



Same seeding August 1958. The seedlings have become well established. History of seedings: (a) August 1957, plowed and contours constructed; (b) September 1957, seeded to pubescent wheat, 6 lbs., and hard fescue, 2 lbs., placing 75 lbs. per acre of ammonium sulphate in drill row.

Deep Furrow Principle Summary

In general, under conditions where the deep furrow drill was used in the Northwest, the following advantages were observed as compared to regular drilling:

1. On rough, loose seedbeds seed can be placed at a more constant depth and more evenly covered than with a regular type drill.
2. By placing seed in bottom of furrows, it gets down to moist, firm soil. It is generally agreed that firm soil under the seed is much more important than packing over the seed.
3. Competition from native vegetation is less severe because furrow openers kick cheatgrass and other vegetation out of the furrow.
4. Better use is made of moisture. The furrows catch and hold moisture.
5. The furrow protects seedling from winds and high temperatures.
6. Furrows aid in overcoming the crusting and heaving problems of some sites.

When furrow openers are used, at least 12-inch row spacing must be used to eliminate one furrow opener filling the furrow next to it.

Ground speed must be reduced in deep furrow seeding to reduce soil throw. The speed will depend upon soil texture and amount of moisture in the soil. About two miles per hour was found to be average.

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Confidence is the feeling
you have before you know
better.

A Short Excerpt from CONQUEST OF THE
LAND THROUGH SEVEN THOUSAND YEARS
by W. C. Lowdermilk 1/

(Editor's Note: Southwestern United States and portions of the Intermountain Region have often been likened to biblical lands. The following excerpt is offered, if you please, as food for thought.)

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If we were to follow the route of Moses out of the fertile, irrigated lands of Egypt into the mountainous lands, we would follow a trail of desolation and ruin.

In the Biblical land of Moab, we would come to the site of Mt. Nebo. We would be reminded of how Moses, after having led the Israelites through 40 years of wandering in the wilderness, stood on this mountain and looked across the Jordan Valley to the Promised Land. He described it to his followers in words like these:

For the Lord thy God bringeth thee into a good land, a land of brooks of water, of fountains and depths that spring out of valleys and hills; a land of wheat and barley and vines and fig trees and pomegranates, a land of olive oil and honey; a land wherein thou shalt eat bread without scarceness; thou shalt not lack anything in it; a land whose stones are iron and out of whose hills thou mayest dig brass.

We would cross the Jordan Valley as did Joshua and find the Jordan River a muddy and disappointing stream.

We would find the soils of red earth washed off the slopes to bedrock over more than half the upland area. These soils would be lodged in the valleys where they are still being cultivated and are still being eroded by great gullies that cut through the alluvium with every heavy rain. Evidence of rocks washed off the hills would be found in piles of stone where tillers of soil had heaped them together to make cultivation about them easier.

1/. Formerly Assistant Chief, Soil Conservation Service.

TUSSOCK MOTH INFESTING RANGE PLANTS
CARSON CITY NEVADA
APPRAISAL SURVEY
June 1958
(Unpublished Report)

By
R. I. Washburn 1/

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At the request of the State Forester of Nevada and the Forest Supervisor, Toiyabe National Forest, an inspection was made to determine the cause and severity of reported damage to range browse plants, principally bitterbrush, in the vicinity of Carson City, Nevada.

Tussock moth, in epidemic numbers, was found to be feeding on bitterbrush, willow, wild rose, and desert peach. The larvae were mature and appeared ready to pupate. It was not possible to determine the species from the larval stage but collections were made and an effort is underway to rear adults for identification. The inspection did not reveal any evidence of virus disease or any abundance of other natural enemies.

The two areas inspected, Ash Creek and Mt. Rose Highway, each contained approximately 20 acres of severe defoliation. (A majority of the bitterbrush was nearly completely defoliated.) The extent of the tussock moth outbreak was not determined but it is probable that much of the foothill range between Carson City and Reno supported populations of the tussock moth. Quite possibly other bitterbrush ranges in western Nevada and eastern California were subjected to defoliation by this tussock moth.

Severe defoliation by the tussock moth is undesirable since it removes much of the palatable forage and in addition repeated defoliation may eventually cause mortality of some of the browse plants. Therefore, all forest and range workers should be alert to detect tussock moth outbreaks, and should report their occurrence promptly to the forest

1/. Entomologist, Intermountain Forest and Range Experiment Station,
U.S.D.A., Forest Service, Ogden, Utah.

entomologists of the Forest Experiment Stations. From August through the remainder of the field season, the presence of a tussock moth population can be detected by the presence of egg clusters. The eggs are laid in masses by the wingless female moths on top of the old cocoon from which they have emerged and are covered with a frothy white substance liberally mixed with hairs from the abdomen. The cocoons, with egg masses, will be found attached to various parts of the shrubs and neighboring plants. The cocoons and egg masses furnish conspicuous evidence of tussock moth. Next spring the eggs will hatch and the small larvae will begin to feed. Epidemic numbers of the tussock moth can be detected in the spring, before feeding becomes conspicuous, by careful examination of the bitterbrush, willow, wild rose, and desert peach for the presence of the small hairy larvae.

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Nothing's easier than watching another man do a job. Nothing's harder than not giving him some advice about how he could do it better.

A METHOD FOR RATING THE SUCCESS OF RANGE SEEDING

(Condensed from Technical Paper No. 329
by D. N. Hyder and F. S. Sneva 1/)

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A fast and easily-used method which will provide an accurate sample of the success attained on seeded rangeland is needed. No practical sampling procedure has been available for general field use in evaluating seeding success. Fields are often described as failure, poor, fair, good, or excellent without the benefit of sample information. It is believed that such ratings would be of more value if reported with a sampled quality of the stands of grass.

For this purpose the relative degree to which the community is closed by the seeded bunchgrass species should be sufficient. The procedure, described in this paper, is based on the percentage of square-foot units stocked by the seeded species.

List-count data is referred to as density, and percentage-stocked data is referred to as frequency.

Sampling Procedure

A welded steel-rod frame 2 x 2 feet square, subdivided into four units 1 x 1 foot square, is used to determine the presence or absence of the seeded species in a sample consisting of 100 one-square-foot observation units (25 randomly-distributed frames). A unit is considered stocked if any portion of the basal area of the seeded species falls inside the one-square-foot frame. Observations are most easily made when the herbage does not obscure the basal portions of the plants.

The number of units stocked in 100 observations is accumulated on a tally register and recorded in percent as an expression of seeding success.

1/. Range Conservationist and Assistant Range Conservationist,
Squaw Butte-Harney Branch Range and Livestock Experiment
Station, Burns, Oregon.

The number of samples (100 observations each) needed depends upon variation in the stand and the degree of accuracy desired. A minimum of five samples should usually be taken. It appears doubtful that more than 12 samples would be required for reliable estimates of seeding success. In highly variable stands, areas of similar density should be delineated and sampled separately.

In addition to data for average percentage-stocked, an examiner using this procedure should present a success rating based upon annual precipitation and other considerations. The success rating is important because areas receiving nine inches annual precipitation might be given a success rating of excellent for a stand 35 percent stocked, whereas an area receiving fifteen inches annual precipitation might be rated excellent only when the stand averaged 90 percent or more.

The following success-rating scale appears to be suitable for areas receiving 10 to 12 inches average annual precipitation:

<u>Success Rating</u>	<u>Percentage Stocked</u>
Excellent	50% or more
Good	40 to 50%
Fair	25 to 40%
Poor	10 to 25%
Failure	9% or less

The success rating is intended to be an empirical and variable quality assigned through judgment as presently practiced by many field examiners when judging seeding success. The rating scale above was based largely upon herbage yield data; however, site quality and soil conservation requirements may influence the success rating used to describe any given stand, but have not been evaluated and are not discussed in this paper.

It may not be assumed without experimental evidence that different unit sizes and cluster arrangements will serve with equal facility, or that this proposal is equally applicable for sampling stands of sod-forming grasses or native stands of bunchgrasses.

